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CLAIMS

[Claim(s)]
[Claim 1] The rear plate which carried the electron emission element. The face plate which carried the image formation member in which a picture is formed of irradiation of the electron emitted from this electron emission element while countering with this rear plate and being arranged. The display panel which consists of a housing which forms the reduced pressure space which specifies the interval of this face plate and this rear plate, and connotes the aforementioned electron emission element and an image formation member with these plates. It is image formation equipment equipped with the above, and is characterized by preparing a heating means in this face plate and this rear plate.
[Claim 2] Image formation equipment according to claim 1 which has the area in which the aforementioned rear plate projects from the periphery of the aforementioned housing.
[Claim 3] Image formation equipment according to claim 1 or 2 with which the heating means by the side of the aforementioned face plate consists of a thin film of the exoergic material which generates heat by energization prepared on this face plate.
[Claim 4] Image formation equipment according to claim 3 which prepared the plurality of the thin film of the aforementioned exoergic material on the aforementioned face plate, and enabled independently the operation of each thin film.
[Claim 5] Image formation equipment according to claim 1 to 4 with which the heating means by the side of the aforementioned rear plate is prepared in the area portion which the aforementioned rear plate projected.
[Claim 6] Image formation equipment according to claim 5 which the aforementioned heating means consisted [ equipment ] of an electrical part generating heat, and contacted this electrical part into the area portion which carried out [ aforementioned ] projection through the heat-conduction member.
[Claim 7] Image formation equipment according to claim 6 characterized by attaching the aforementioned electrical part which carries out generation of heat on an electrical circuit substrate.
[Claim 8] Image formation equipment according to claim 7 whose aforementioned electrical circuit substrate is an electrical circuit substrate for a display-panel drive.
[Claim 9] Image formation equipment according to claim 1 to 4 with which the heating means by the side of the aforementioned rear plate is prepared in the outer wall of the aforementioned housing with the area portion which the aforementioned rear plate projected.
[Claim 10] Image formation equipment according to claim 9 which the aforementioned heating means consisted [ equipment ] of an electrical part generating heat, and contacted this electrical part in the area portion and the aforementioned housing outer wall which carried out [ aforementioned ] projection through the heat-conduction member.
[Claim 11] Image formation equipment according to claim 1 to 4 with which the heating means by the side of the aforementioned rear plate consists of a thin film of the exoergic material which generates heat by energization prepared on this rear plate.
[Claim 12] Image formation equipment according to claim 11 which prepared the plurality of the thin film of the aforementioned exoergic material on the aforementioned rear plate, and enabled independently the operation of each thin film.
[Claim 13] The claims 1-4 which control the aforementioned heating means based on the temperature information which has a thermo sensor on the aforementioned face plate or the aforementioned rear plate, and is acquired from this thermo sensor, image formation equipment given in either 11 and 12.
[Claim 14] Image formation equipment according to claim 1 to 13 whose aforementioned electron emission element is a surface conduction type electron emission element.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention applies the electron from an electron emission element to an image formation member according to image information, and relates to the image formation equipment which forms and displays a picture.
[0002]
[Description of the Prior Art] Although the delay vision system (henceforth television) was the most common as equipment which forms and displays a picture, recently, it is more compact and monotonous type image formation equipment (monotonous type display panel) has attracted attention as what makes image display of a big screen possible.
[0003] Monotonous type image formation equipment can perform lightweight [ large ] and thin shape-ization compared with television which uses CRT, and more moreover than television makes image formation in a big screen possible, and has the advantage of not spoiling the size or fine sight of installation space.
[0004] The thing of various methods, such as a method using plasma electric discharge as this monotonous type image formation equipment, a method using the electron emission element, and a method using the liquid crystal panel, is developed.
[0005] Although the monotonous type display which used liquid crystal has replaced and spread through CRT in monotonous type image formation equipment, since it is not a spontaneous light type, there is a trouble of having to have a back light, and development of spontaneous light type display is performed briskly. By the electron emitted from the electron source which has arranged many surface conduction type discharge elements as spontaneous light type display, and the electron source, the image formation equipment which is the display which combined the fluorescent substance which makes the light emit light is raised (for example, USP5066883).
[0006]
[Problem(s) to be Solved by the Invention] The rear plate with which electron emission type monotonous type image formation equipment carried the electron emission element, The face plate which carried the image formation member in which a picture is formed of irradiation of the electron emitted from this electron emission element while countering with this rear plate and having been arranged, What has the display panel which consists of a housing which forms the reduced pressure space which specifies the interval of this face plate and this rear plate, and connotes the aforementioned electron emission element and an image formation member with these plates is common. The arrangement to the substrate of many electron emission elements is easy for this monotonous type image formation equipment, and it has the advantage that large-area-izing and thin-shape-izing of a screen are easy.
[0007] However, deformation by the thermal strain may arise in the board member which forms equipment by generation of heat by the collision of the electron to the image formation member which a face plate has etc., and the inclination which becomes remarkable by the case where equipment is thin-shape[ enlargement and ]-ized has generating of this thermal strain. The deformation by such thermal strain causes the problems, such as making the collision to the exact position of the electron to the image formation member prepared in the face plate produce deviation etc., and reduces the reliability of equipment.
[0008] With old image formation equipment, common practice, such as natural thermolysis and forced-air cooling, has been used about thermolysis of a display panel etc.
[0009] It follows on enlargement and thin shape-ization of equipment. however, in common practice like such natural thermolysis or forced-air cooling (1) cannot perform efficient cooling of a display panel but by generation of heat produced with a drive because generation of heat of electron-source substrate wiring and the electron emitted from the electron source collide to up to a face plate The thermal strain occurred in the display panel and there were problems, like spaces for installation where the reliability as equipment becomes low, such as a radiation fin for (2) display panels and an air-cooling fan, become the hindrance of thin-shape-izing.
[0010] The method of forming a heater in the front-windshield container which applied the fluorescent substance as a method of solving this problem, and controlling temperature is learned (for example, JP,1-173554,A). However, according to examination of this invention persons, there was a limitation in raising the generating prevention effect of a thermal strain more with the composition which prepared the heating means for thermal-strain prevention only in the member which constitutes the front face which has an image formation side.
[0011] That is, with the monotonous type image formation equipment which adopted the electron emission method, there were

problems -- deformation of the rear plate which a thermal strain may produce on the rear plate other than generation of heat of a face plate by generation of heat of an electron emission element, and was produced by this thermal strain makes the arrangement position of an electron emission element produce deviation etc..
[0012] the board by the above-mentioned thermal strain in the monotonous type image formation equipment with which image formation equipment, especially the electron emission method were used for the purpose of this invention -- it is in preventing deformation of a member more effectively and offering the composition which can boil the reliability of equipment markedly and can raise it
[0013]
[Means for Solving the Problem] The image formation equipment of this invention which can solve the above-mentioned technical problem The face plate which carried the image formation member in which a picture is formed of irradiation of the electron emitted from this electron emission element while countering with the rear plate which carried the electron emission element, and this rear plate and having been arranged, In the image formation equipment which has the display panel which consists of a housing which forms the reduced pressure space which specifies the interval of this face plate and this rear plate, and connotes the aforementioned electron emission element and an image formation member with these plates It is characterized by preparing a heating means in this face plate and this rear plate.
[0014] the board generated by the thermal strain which according to this invention the heating means for thermal-strain generating prevention is prepared in both the face plate and the rear plate, and originates in the heat release inside equipment -- deformation of a member etc. can be prevented more effectively
[0015]
[Embodiments of the Invention] Although the thing of various composition can be used as a heating means of the face plate in the image formation equipment of this invention, and a rear plate, what has the composition acting as the obstacle of enlargement of equipment or thin-shape-izing is desirable. It is [, for example / no need for reservation of the installation space where the method of rearranging efficiently what generates heat the material which generates heat by energization thin film-ized ****** and in the already used electrical part at the time of the operation, and using it as a heating means is new ] as such a thing and is suitable.
[0016] As a material heated by energization in which thin-film-izing is possible, metals, such as Ag, Cu, Cr, Zn, Pb, Fe, and Sn, can be mentioned. According to the composition of the image formation equipment to be used, the thickness of the thin film for heating, a configuration, an installation position, etc. are suitably chosen so that the purpose of this invention and an effect can be attained. Formation of the thin film in the case of using the thin film of these metals as a heating means can be performed using a vacuum deposition method, print processes, a spatter, etc. The method of calcinating and making it fixing as a simple method after carrying the fused metal paste in a predetermined configuration on a face plate or a rear plate with a dispenser or a printing roller is employable. The usual method of preparing a conductive metal etc. on a plate by the predetermined pattern can be used for formation of wiring to a thin film. The plurality of the thin film for heating is prepared, by operating each thin film independently, a more precise temperature control can become possible and the thermal-strain prevention effect can be raised further.
[0017] the thermal conductivity which can use the parts (element) with which a high current is added, the parts with which high pressure is added, the parts (element) which perform switching when using an electrical part as a heating means, and is connected to these and these -- it arranges to the part which is going to heat a part of member [ at least ] In addition, parts which there is comparatively little generation of heat, or do not generate heat, such as parts (element) which carry out signal processing, and parts (element) which make a reference signal, are not contained in this.
[0018] As an installation position of a heating means, it considers as portions other than the portion heated by generation of heat accompanying the operation of the equipment in a face plate and a rear plate, and generating of a thermal strain is prevented by equalization of the temperature distribution in the same plate by this heating means, for example.
[0019] In this invention, it may consider as the composition which has the area which projects a rear plate from the periphery of a housing, and a heating means may be prepared in this lobe. Furthermore, the thermal-strain prevention effect can be further raised by preparing a heating means also in a housing outer wall with such a lobe. Moreover, there are also few face PUTO and rear plates, while a thermo sensor can be arranged, a heating means can be controlled based on the temperature information acquired from this thermo sensor, and the thermal strain by more efficient temperature management can be prevented. Moreover, if a radiation fin and an air-cooling fan can be decreased and the thing of composition without increase of an installation space is moreover used as a heating means for thermal-strain prevention, a miniaturization, thin-shape-izing, and lightweight-izing are possible, and the image formation equipment which moreover improved can be offered.
[0020] As image formation equipment of this invention, structure is simple, what has a surface conduction type electron emission element with an easy process is suitable, and the composition for the thermal-strain prevention by the heating means of this invention reaches to an extreme and is effective about especially the thing of the structure where a face plate and a rear plate are prepared by approaching.
[0021] It divides roughly into the fundamental composition of the surface conduction type electron emission element which can be used by this invention, and there are two, a flat-surface type and a vertical type.
[0022] First, a flat-surface type surface conduction type electron emission element is explained. Drawing 13 is the ** type view showing the composition of a flat-surface type surface conduction type electron emission element, drawing 13 (a) is a plan and drawing 13 (b) is a cross section. For 131, as for an element electrode and 134, in drawing 13 , a substrate, and 132 and 133 are a conductive thin film and 135 ] the electron emission sections.

[0023] Ceramic substrates, such as a glass substrate on which SiO2 was made to deposit as a substrate 131 by the glass which reduced impurity contents, such as quartz glass and Na, blue sheet glass, the spatter, etc., and an alumina, etc. can be used.
[0024] As a material of the element electrodes 132 and 133 which counter A general electrical conducting material can be used. nickel, Cr, Au, Mo, W, It can choose from semiconductor materials which consist of a metal, a metallic oxide, glass, such as metals, such as Pt, Ti, aluminum, Cu, and Pd, or an alloy and Pd, As, Ag, Au and RuO2, and Pd-Ag, etc., such as a printed conductor, a transparent conductor of In2O3-SnO2 grade, and contest polysilicon.
[0025] The configuration of the element electrode spacing L, element electrode length W, and the conductive thin film 134 etc. is designed in consideration of the form applied. The element electrode spacing L is the range of 100 micrometers of thousands ofA to numbers preferably, and the range of it is 1 to 100 micrometers in consideration of the voltage more preferably impressed to element inter-electrode.
[0026] Element electrode length W is the range of 100 micrometers of numbers from several micrometers in consideration of the resistance of an electrode, and the electron emission characteristic. The range of the thickness d of the element electrodes 132 and 133 is 1 micrometer from 100A.
[0027] In addition, it can also consider as the composition which carried out the laminating at the order of the conductive thin film 134 and the element electrodes 132 and 133 which counter not only the composition shown in drawing 13 but on the substrate 131.
[0028] In order to obtain the good electron emission characteristic to the conductive thin film 134, it is desirable to use the particle film which consisted of particles. Although the thickness is suitably set up in consideration of resistance, foaming conditions mentioned later between the step coverage to the element electrodes 132 and 133, the element electrode 132, and 133, considering as the range of 500A is more preferably [ preferably / usually considering as the range of 1000A of numbers from severalangstroms /, and ] better than 10A. Rs of the resistance is 1x10+2 to 1x10+7 ohms in value. In addition, Rs is the value which appears when thickness sets the resistance R of the thin film of l with t and length sets [ width of face ] it with R=Rs (l/w) by w, and when the resistivity of a thin film material is set to rho, it is expressed with Rs=rho/t. In this application specification, although energization processing is mentioned as an example and explained about foaming processing, as long as foaming processing is the method of not being restricted to this, making a film produce a crack, and forming a high resistance state, what method may be used for it.
[0029] The material which constitutes the conductive thin film 134 Pd, Pt, Ru, Ag, Au, Metals, such as Ti, In, Cu, Cr, Fe, Zn, Sn, Ta, W, and Pb, The oxide of PdO, SnO2, In2O3, PbO, and Sb2O3 grade, HfB2, ZrB2, LaB6, CeB6 and YB4, the boride of GdB4 grade, It is suitably chosen from semiconductors, such as nitrides, such as carbide, such as TiC, ZrC, HfC, TaC, SiC, and WC, and TiN, ZrN, HfN, and Si, germanium, carbon, etc.
[0030] The particle film described here is a film with which two or more particles gathered, and the state or particle to which the particle distributed the fine structure separately has taken mutually contiguity or the state (it contains, when some particles gather and island-like structure is formed as a whole) where it overlapped. the particle size of a particle -- the range of severalangstroms to 1 micrometer -- it is the range of 10 to 200A preferably
[0031] The electron emission section 135 is constituted by the crack of high resistance formed in a part of conductive thin film 134, and becomes a thing depending on technique, such as thickness of the conductive thin film 134, membraneous quality, material, and energization foaming mentioned later, etc. Inside the electron emission section 135, a conductive particle with a particle size of 1000A or less may be included. This conductive particle contains some elements of the material which constitutes the conductive thin film 134, or all elements. Carbon or a carbon compound may be included in the electron emission section 135 and the conductive thin film 134 of the near.
[0032] Next, a vertical-type surface conduction type electron emission element is explained. Drawing 14 is the ** type view showing an example of a vertical-type surface conduction type electron emission element. In drawing 14 , the same sign as the sign given to drawing 13 is given to the same part as the part shown in drawing 13 . 136 is the level difference formation section. A substrate 131, the element electrodes 132 and 133, the conductive thin film 134, and the electron emission section 135 can consist of the same material as the case of the flat-surface type surface conduction type electron emission element mentioned above. The level difference formation section 136 can consist of insulating material of the SiO2 grade formed by the vacuum deposition method, print processes, the spatter, etc. The thickness of the level difference formation section 136 can respond to the element electrode spacing L of the flat-surface type surface conduction type electron emission element described previously, and let it be the range of 10 micrometers of numbers from thousands ofA. Although this thickness is set up in consideration of the voltage impressed to the process of the level difference formation section, and element inter-electrode, its range of several micrometers is desirable from hundreds ofA.
[0033] The laminating of the conductive thin film 134 is carried out on these element electrodes 132 and 133 after the element electrodes 132 and 133 and level difference formation section 136 creation. Although the electron emission section 135 is formed in the level difference formation section 136 in drawing 14 , depending on creation conditions, foaming conditions, etc., a configuration and a position are not restricted to this.
[0034] Although there are various methods as the manufacture method of an above-mentioned surface conduction type electron emission element, the example is typically shown in drawing 15 . Hereafter, an example of the manufacture method is explained, referring to drawing 13 and drawing 15 . Also in drawing 15 , the same sign as the sign given to drawing 13 is given to the same part as the part shown in drawing 13 .
1) Fully wash a substrate 131 using a detergent, pure water, the organic solvent, etc., and form the element electrodes 132 and

133 on a substrate 131 after depositing an element electrode material using photo lithography technology by the vacuum deposition method, the spatter, etc. ( drawing 15 (a)).
2) Apply an organic-metal solution to the substrate 131 which formed the element electrodes 132 and 133, and form an organic-metal thin film. The solution of the organometallic compound which uses the metal of the material of the above-mentioned conductive film 134 as the main element can be used for an organic-metal solution. Heating baking processing of the organic-metal thin film is carried out, patterning is carried out by the lift off, etching, etc., and the conductive thin film 134 is formed ( drawing 15 (b)). Here, although the method of applying an organic-metal solution was mentioned and explained, the method of forming the conductive thin film 134 is not restricted to this, and can also use a vacuum deposition method, a spatter, a modified chemical vapor deposition, the distributed applying method, a dipping method, the spinner method, etc.
3) Continue and perform foaming processing. The method by energization processing is explained as an example of this foaming art. If it energizes between the element electrode 132 and 133 using a non-illustrated power supply, the electron emission section 135 from which structure changed to the part of the conductive thin film 134 will be formed ( drawing 15 (c)). According to energization foaming, the part which changed [ deterioration / destruction, deformation, or ] structurally locally is formed in the conductive thin film 134. This part serves as the electron emission section 135. The example of the voltage waveform of energization foaming is shown in drawing 16 .
[0035] Pulse shape of a voltage waveform is desirable. There are the technique of having shown the pulse which made the pulse height value the constant voltage to drawing 16 (a) impressed continuously, and technique shown in drawing 16 (b) which impresses a voltage pulse while making a pulse height value increase in this.
[0036] T1 and T2 in drawing 16 (a) are the pulse width and pulse separation of a voltage waveform. Usually, T1 is set up and T2 is set up in the range for 10 microseconds - 100ms for 1 microsecond to 10ms. The peak value (peak voltage at the time of energization foaming) of a triangular wave is suitably chosen according to a surface conduction type electron emission element form. Voltage is impressed from the basis of such conditions, for example, several seconds, for number 10 minutes. Pulse shape is not limited to a triangular wave and can adopt the wave of requests, such as a square wave.
[0037] T1 and T2 in drawing 16 (b) can be made the same with having been shown in drawing 16 (a). the peak value (peak voltage at the time of energization foaming) of a triangular wave -- 0.1 [ for example, ] -- you can make it increase about V steps at a time The end of energization foaming processing can impress the voltage of the grade which does not break locally and does not transform the conductive thin film 134 into pulse separation T2, and can measure and detect current. For example, energization foaming is terminated, when the element current which flows by voltage impression of an about [ 0.1V ] is measured, resistance is calculated and resistance of 1 M omega or more is shown.
4) It is desirable to give activation to the element which finished foaming. By giving activation, element current If and the emission current Ie change remarkably.
[0038] Activation can be performed by repeating impression of a pulse like energization foaming under the atmosphere containing the gas of an organic substance. When the inside of a vacuum housing is exhausted using an oil diffusion pump, a rotary pump, etc., it can form using the organic gas which remains in atmosphere, and also this atmosphere is acquired by introducing the gas of an organic substance suitable in the vacuum once exhausted fully by the ion pump etc. Since it changes with the gestalt of the above-mentioned application, the configuration of a vacuum housing, kinds of organic substance, etc., gas ** of the desirable organic substance at this time is suitably set up according to a case. As a suitable organic substance, an alkane, an alkene, and the aliphatic hydrocarbon of an alkyne Organic acids, such as aromatic hydrocarbons, alcohols, aldehydes, ketones, amines, a phenol, a carboxylic acid, and a sulfonic acid, can be mentioned. specifically Saturated hydrocarbons expressed with CnH2n+2, such as methane, ethane, and a propane, The unsaturated hydrocarbon expressed with empirical formulas, such as CnH2n, such as ethylene and a propylene Benzene, toluene, a methanol, ethanol, formaldehyde, an acetaldehyde, an acetone, a methyl ethyl ketone, a monomethylamine, an ethylamine, a phenol, formic acid, an acetic acid, a propionic acid, etc. can be used. Carbon or a carbon compound accumulates on an element from the organic substance which exists in atmosphere by this processing, and element current If and the emission current Ie change remarkably.
[0039] The end judging of an activation process is performed measuring element current If and the emission current Ie. In addition, pulse width, pulse separation, a pulse height value, etc. are set up suitably.
[0040] With carbon or a carbon compound, HOPG (Highly OrientedPyrolytic Graphite), graphite, such as PG (Pyrolytic Graphite) and GC (Glassy Carbon), mentions -- having (the graphite in which HOPG has nearly-perfect-crystal structure --) the graphite to which, as for PG, the crystal structure was confused a little by crystal grain by about 200A, and GC point out that to which it became large [ disorder of the crystal structure ] by about 20A further [ crystal grain ] It is amorphous carbon (amorphous carbon and amorphous carbon, and carbon containing the mixture of the microcrystal of the aforementioned graphite), and it is desirable to make it 500A or less, and if the thickness is 300A or less, it is more desirable.
5) As for the electron emission element pass the activation process, it is desirable to perform stabilizing treatment. It is good that the partial pressure of the organic substance in a vacuum housing performs desirably 1x10 to 8 or less torrs of this processing by 1x10 to 10 or less torrs. The pressure in a vacuum housing has 10-6.5 - desirable 10-7torr, and its 1x10 to 8 or less torrs are especially desirable. As for the evacuation equipment which exhausts a vacuum housing, it is desirable to use what does not use oil so that the oil generated from equipment may not affect the property of an element. Specifically, evacuation equipments, such as a sorption pump and an ion pump, can be mentioned. When exhausting the inside of a vacuum housing furthermore, it is desirable to make easy to exhaust the organic substance molecule which heated the whole vacuum housing and stuck to the vacuum housing wall or the electron emission element. Although the evacuation conditions in the state where it heated at this time

have 5 desirable hours or more at 80-200 degrees C, they are not restricted to especially this condition and change with terms and conditions, such as a size of a vacuum housing, and composition of a configuration and an electron emission element. In addition, partial pressure measurement of the above-mentioned organic substance measures the partial pressure of the organic molecule to which the mass number makes the carbon and hydrogen of 10-200 a principal component by the mass spectroscope, and asks for it by integrating those partial pressures.

[0041] Although it is desirable to maintain the atmosphere at the time of the above-mentioned stabilizing treatment end as for the atmosphere at the time of a drive after passing through a stabilization process, if it does not restrict to this and the organic substance is removed enough, even if some degree of vacuum itself falls, it can maintain a sufficiently stable property.

[0042] By adopting such a vacuum atmosphere, deposition of new carbon or a carbon compound can be suppressed, and element current If and the emission current Ie are stabilized as a result.

[0043] About the array of an electron emission element, various things are employable.

[0044] There is a thing of the ladder-like arrangement which carries out the control drive of the electron from an electron emission element by the control electrode (it is also called a grid) which connected as an example each of the electron emission element of a large number arranged in parallel at both ends, allotted many lines of an electron emission element (it is called a line writing direction), and was allotted above this electron emission element towards intersecting perpendicularly with this wiring (it being called the direction of a train). What connects one side of the electrode of two or more electron emission elements which allotted two or more electron emission elements in the direction of X and the direction of Y in the shape of a matrix, and were allotted to the same line apart from this common to wiring of the direction of X, and connects another side of the electrode of two or more electron emission elements allotted to the same train common to wiring of the direction of Y is mentioned. Such a thing is the so-called simple matrix arrangement. Simple matrix arrangement is explained in full detail below first.

[0045] The electron-source substrate which allots two or more electron emission elements in the shape of a matrix, and is obtained is explained using drawing 17 . As for an electron-source substrate and 172, in drawing 17 , 171 is [ the direction wiring of X and 173 ] the direction wiring of Y. 174 is a surface conduction type electron emission element, and 175 is connection. In addition, the surface conduction type electron emission element 174 may be whichever of the flat-surface type mentioned above or a vertical type.

[0046] the direction wiring 172 of X of m -- Dx1, Dx2, and ... it consists of Dxm and can constitute from a conductive metal formed using a vacuum deposition method, print processes, the spatter, etc. The material of wiring, thickness, and width are designed suitably. the direction wiring 173 of Y -- Dy1, Dy2, and ... it consists of wiring of n of Dyn, and is formed like the direction wiring 172 of X The non-illustrated layer insulation layer is prepared between the direction wiring 172 of X of these m, and the direction wiring 173 of Y of n, and both are separated electrically (both m and n are a positive integer).

[0047] A non-illustrated layer insulation layer consists of SiO2 grades formed using a vacuum deposition method, print processes, the spatter, etc. For example, it is formed in the configuration of the whole surface of the substrate 171 in which the direction wiring 172 of X was formed, or in part a request, and thickness, material, and a process are set up so that the potential difference of the intersection of the direction wiring 172 of X and the direction wiring 173 of Y can be borne especially. The direction wiring 172 of X and the direction wiring 173 of Y are pulled out as an external terminal, respectively.

[0048] The electrode (un-illustrating) of the couple which constitutes the surface conduction type discharge element 174 is electrically connected by the connection 175 which consists of the direction wiring 172 of X of m, direction wiring 173 of Y of n, a conductive metal, etc.

[0049] Even if the material which constitutes the material which constitutes wiring 172 and wiring 173, the material which constitutes connection 175, and the element electrode of a couple has same some or all of the composition element, they may differ, respectively. These material is suitably chosen from the material of the above-mentioned element electrode. When the material and the wiring material which constitute an element electrode are the same, the wiring linked to the element electrode can also be called element electrode.

[0050] A scanning signal impression means by which it does not illustrate [ which impresses the scanning signal for choosing the line of the surface conduction type discharge element 174 arranged in the direction of X ] is connected to the direction wiring 172 of X. On the other hand, a modulating-signal generating means by which it does not illustrate for modulating each train of the surface conduction type discharge element 174 arranged in the direction of Y according to an input signal is connected to the direction wiring 173 of Y. The driver voltage impressed to each electron emission element is supplied as difference voltage of the scanning signal impressed to the element concerned, and a modulating signal.

[0051] In the above-mentioned composition, using simple matrix wiring, an individual element can be chosen and a drive can be made independently possible.

[0052] The image formation equipment constituted using the electron source of such simple matrix arrangement is explained using drawing 18 , drawing 19 , and drawing 20 . Drawing 18 is the ** type view showing an example of the display panel of image formation equipment, and drawing 19 is the ** type view of the fluorescent screen used for the image formation equipment of drawing 18 . Drawing 20 is the block diagram showing an example of the drive circuit for displaying according to the television signal of an NTSC color TV system.

[0053] The electron-source substrate which 171 allotted two or more electron emission elements in drawing 18 , the rear plate with which 181 fixed the electron-source substrate 171, and 186 are the face plates by which the fluorescent screen 184 and the metal back 185 grade were formed in the inside of a glass substrate 183. 182 is a housing and the rear plate 181 and the face plate 186 are connected to this housing 182 using frit glass etc. 188 is an envelope, for example, is calcinated 10 minutes or more by

the temperature requirement of 400 - 500 degrees in the atmosphere or nitrogen, and seals.
[0054] 174 is equivalent to the electron emission section in drawing 13 . 172 and 173 are the direction wiring of X and the direction wiring of Y which were connected with the element electrode of the couple of a surface conduction type electron emission element.
[0055] An envelope 188 consists of a face plate 186, a housing 182, and a rear plate 181 like ****. Since it is prepared in order to mainly reinforce the intensity of the electron-source substrate 171, the rear plate 181 can be made unnecessary [ the rear plate 181 of another object ] when it has intensity sufficient by electron-source substrate 171 the very thing. That is, the direct housing 182 is sealed in a substrate 171, and an envelope 188 may consist of a face plate 186, a housing 182, and a substrate 171. The envelope 188 which has sufficient intensity to atmospheric pressure between a face plate 186 and the rear plate 181 on the other hand by installing the base material which is not illustrated [ which it is called spacer (atmospheric pressure-proof supporter material) ] can also be constituted.
[0056] Drawing 19 is the ** type view showing a fluorescent screen. In the case of monochrome, a fluorescent screen 184 can consist of only fluorescent substances. In the case of the fluorescent screen of a color, it can constitute from the black member 191 and fluorescent substance 192 which are called a black stripe or black matrix by the array of a fluorescent substance. In the case of color display, the purpose which establishes a black stripe and a black matrix is to suppress [ it not being conspicuous and carrying out color mixture etc. by distinguishing by different color between each fluorescent substance 192 of a needed three-primary-colors fluorescent substance with, and making the section black, and ] the fall of the contrast by outdoor daylight reflection. This can be used if transparency and reflection of light besides the material which makes a principal component the graphite usually used as a material of a black stripe are a few material.
[0057] The method of applying a fluorescent substance to a glass substrate 193 is not based on monochrome and a color, but a precipitation method, print processes, etc. can be used for it. The metal back 185 is usually formed in the inside side of a fluorescent screen 184. The purposes which prepare the metal back are making it act as an electrode for impressing raising brightness and electron beam acceleration voltage, protecting a fluorescent substance from the damage by the collision of the anion generated within the envelope, etc. by carrying out specular reflection of the light by the side of an inside to a face plate 186 side among luminescence of a fluorescent substance. The metal back performs data smoothing (usually called "filming".) of the inside side front face of a fluorescent screen after fluorescent-screen production, and it can produce by making aluminum deposit using vacuum deposition etc. after that.
[0058] In order to raise the conductivity of a fluorescent screen 184 to a face plate 186 further, you may prepare a transparent electrode (un-illustrating) in the superficies side (glass-substrate 183 side) of a fluorescent screen 184.
[0059] In case the above-mentioned sealing is performed, the case of a color needs to make each color fluorescent substance and an electron emission element correspond, and becomes indispensable [ sufficient alignment ].
[0060] The image formation equipment shown in drawing 18 is manufactured as follows, for example. An envelope 188 is closed, after exhausting through a non-illustrated exhaust pipe with the exhaust which does not use oil, such as an ion pump and a sorption pump, and making it a sufficiently few atmosphere of the organic substance of the degree of vacuum of about 1x10 to 7 torrs like the above-mentioned stabilization process, heating suitably. Getter processing can also be performed in order to maintain the degree of vacuum after closure of an envelope 188. This is processing which heats the getter arranged at the position in an envelope 188 (un-illustrating), and forms a vacuum evaporationo film by heating which used resistance heating or high-frequency heating after closure just before closing the envelope 188. Ba etc. is usually a principal component and a getter maintains the degree of vacuum of 1x10-5 or 1x10-7torr by the absorption of this vacuum evaporationo film.
[0061] Next, the example of composition of the drive circuit for performing the television display based on the television signal of an NTSC color TV system is explained to the display panel constituted using the electron source of simple matrix arrangement using drawing 20 . For 201, as for a scanning circuit and 203, in drawing 20 , an image display display panel and 202 are [ a control circuit and 204 ] shift registers. For 205, line memory and 206 are [ a modulating-signal generator and Vx and Va of a synchronizing signal separation circuit and 207 ] direct current voltage supplies.
[0062] The display panel 201 has connected with an external electrical circuit through a terminal Dox1 or Doxm, a terminal Doy1 or Doyn, and a secondary terminal Hv. the surface conduction type electron emission elements by which matrix wiring was carried out at the electron source prepared in the display panel at a terminal Dox1 or Doxm, i.e., the letter of a matrix of a m line n train, -- every [ a party (n elements) ] -- the scanning signal for driving one by one is impressed
[0063] The modulating signal for controlling the output electron beam of each element a party's surface conduction type electron emission element chosen by the aforementioned scanning signal is impressed to a terminal Doy1 or Doyn. Although 10kV direct current voltage is supplied to a secondary terminal Hv from direct current voltage supply Va, this is the acceleration voltage for giving sufficient energy exciting a fluorescent substance to the electron beam emitted from a surface conduction type electron emission element.
[0064] A scanning circuit 202 is explained. Inside, this circuit is the thing equipped with m switching elements (S1 or Sm shows typically among drawing), and is located. Each switching element chooses the output voltage of direct current voltage supply Vx, or either of 0V (grand level), and is electrically connected with the terminal Dox1 of a display panel 201, or Doxm. Each switching element of S1 or Sm can operate based on the control signal Tscan which a control circuit 203 outputs, and can be constituted by combining a switching element like FET for example.
[0065] In this example, direct current voltage supply Vx are set up so that fixed voltage which the driver voltage impressed to the element which is not scanned based on the property (electron emission threshold voltage) of a surface conduction type electron

emission element turns into below electron emission threshold voltage may be outputted.
[0066] A control circuit 203 has the function to adjust operation of each part so that a suitable display may be performed based on the picture signal inputted from the exterior. A control circuit 203 generates each control signal of Tscan, Tsft, and Tmry to each part based on the synchronizing signal Tsync sent from the synchronizing signal separation circuit 206.
[0067] The synchronizing signal separation circuit 206 is a circuit for separating a synchronizing signal component and a luminance-signal component from the television signal of an NTSC color TV system inputted from the outside, and can be constituted using a general frequency-separation (filter) circuit etc. The synchronizing signal separated by the synchronizing signal separation circuit 206 was illustrated as a Tsync signal after [ expedient ] explaining here, although it consisted of the vertical synchronizing signal and the horizontal synchronizing signal. The luminance-signal component of the picture separated from the aforementioned television signal was expressed as the DATA signal for convenience. This DATA signal is inputted into a shift register 204.
[0068] It operates based on the control signal Tsft which a shift register 204 is for carrying out serial/parallel conversion of the aforementioned DATA signal inputted serially for every line of a picture, and is sent from the aforementioned control circuit 203 (that is, it can also be said that a control signal Tsft is the shift clock of a shift register 204). The data for the picture of one line by which serial/parallel conversion was carried out (equivalent to the drive data for n electron emission elements) are outputted from the aforementioned shift register 204 as n parallel signals of Id1 or Idn.
[0069] The line memory 205 is the storage for during required time memorizing the data for the picture of one line, and memorizes the content of Id1 or Idn suitably according to the control signal Tmry sent from a control circuit 203. The memorized content is outputted as I'd1 or I'dn, and is inputted into the modulating-signal generator 207.
[0070] The modulating-signal generator 207 is a source of a signal for carrying out the drive modulation of each of a surface conduction type electron emission element appropriately according to each of image data I'd1 or I'dn, and the output signal is impressed to the surface conduction type electron emission element in a display panel 201 through a terminal Doy1 or Doyn.
[0071] The electron emission element has the following basic properties to the emission current Ie. That is, there is clear threshold voltage Vth in electron emission, and only when the voltage more than Vth is impressed, electron emission arises. To the voltage more than an electron emission threshold, the emission current also changes according to change of the applied voltage to an element. Although electron emission is not produced from this even if it impresses the voltage below an electron emission threshold when impressing pulse-like voltage to this element for example, an electron beam is outputted when impressing the voltage more than an electron emission threshold. It is possible in that case to control the intensity of an output electron beam by changing the peak value Vm of a pulse. Moreover, it is possible to control the total amount of the charge of the electron beam outputted by changing the width of face Pw of a pulse. Therefore, according to an input signal, a voltage modulation technique, pulse width modulation, etc. are employable as a method which modulates an electron emission element. It faces carrying out a voltage modulation technique, and as a modulating-signal generator 207, the voltage pulse of fixed length is generated and the circuit of a voltage modulation technique which modulates the peak value of a pulse suitably according to the data inputted can be used.
[0072] It faces carrying out pulse width modulation and the circuit of pulse width modulation which generates the voltage pulse of fixed peak value as a modulating-signal generator 207, and modulates the width of face of a voltage pulse suitably according to the data inputted can be used.
[0073] The thing of an analog signal formula can also be used for a shift register 204 or the line memory 205 also for the thing of a digital signal formula. It is because serial/parallel conversion of a picture signal and storage should just be performed at the rate of predetermined.
[0074] What is necessary is just to prepare an A/D converter in the output section of 206 at this, although it is necessary to digital-signal-ize the output signal DATA of the synchronizing signal separation circuit 206 when using a digital signal formula. The circuit where the output signal of the line memory 205 is used for the modulating-signal generator 207 by the digital signal or the analog signal in relation to this becomes a different thing a little. That is, in the case of the voltage modulation technique using the digital signal, an amplifying circuit etc. is added to the modulating-signal generator 207 if needed for example, using a D/A-conversion circuit. In the case of pulse width modulation, the circuit which combined the comparator (comparator) which compares with the output value of the aforementioned memory the output value of the counter (counter) which carries out counting of the wave number which high-speed VCO and VCO output, and a counter is used for the modulating-signal generator 207. The amplifier for amplifying the voltage of the modulating signal which a comparator outputs and by which PDM was carried out even to the driver voltage of a surface conduction type electron emission element if needed can also be added.
[0075] In the case of the voltage modulation technique using the analog signal, the amplifying circuit which used the operational amplifier etc. can be adopted as the modulating-signal generator 207, and a level shift circuit etc. can also be added to it if needed. In the case of pulse width modulation, for example, an armature-voltage control type oscillator circuit (VCO) can be adopted, and the amplifier for amplifying the voltage to the driver voltage of a surface conduction type electron emission element if needed can also be added to it.
[0076] In the image display equipment which can take such composition, electron emission arises by impressing voltage to each electron emission element through the container outer edge child Dox1 or Doxm, Doy1, or Doyn. High pressure is impressed to the metal back 185 or a transparent electrode (un-illustrating) through a secondary terminal Hv, and an electron beam is accelerated. The accelerated electron collides with a fluorescent screen 184, luminescence produces it, and a picture is formed.
[0077] The composition of the image formation equipment described here is an example, and various deformation is possible for

it. About an input signal, although the NTSC color TV system was held, an input signal is not restricted to this and can also adopt TV signal (for example, high-definition TV including MUSE) methods which consist of much scanning lines rather than others and this, such as PAL and an SECAM system.
[0078] Next, the electron source and image formation equipment of ladder type arrangement are explained using drawing 21 and drawing 22 .
[0079] Drawing 21 is the ** type view showing an example of the electron source of ladder type arrangement. In drawing 21 , 210 is an electron-source substrate and 211 is an electron emission element. 212, and Dx1-Dx10 are common wiring for connecting the electron emission element 211. Two or more electron emission elements 211 are allotted in parallel with the direction of X on the substrate 210 (this is called element line). Two or more these element lines are allotted, and constitute the electron source. Each element line can be made to drive independently by impressing driver voltage between common wiring of each element line. That is, the voltage below an electron emission threshold is impressed to the element line which does not emit an electron beam for the voltage more than an electron emission threshold to an element line to make it emit an electron beam. The common wiring Dx2-Dx9 of each element spacing can also consider Dx2 and Dx3 as the same wiring.
[0080] Drawing 22 is the ** type view showing an example of the panel structure in image formation equipment equipped with the electron source of ladder type arrangement. since a grid electrode passes 220 and an electron passes 221 -- opening and 222 -- Dox1, Dox2, and ... it is the container outer edge child who consists of Doxm G1, G2, and ... by which 223 was connected with the grid electrode 220 -- the container outer edge child who consists of Gn, and 210 are the electron-source substrates which considered common wiring of each element spacing as the same wiring In drawing 22 , the same sign as having given these drawings is given to the same part as the part shown in drawing 18 and drawing 21 . The big difference between the image formation equipment shown here and the image formation equipment of simple matrix arrangement shown in drawing 18 is whether to have the grid electrode 220 between the electron-source substrate 210 and the face plate 186.
[0081] In drawing 22 , the grid electrode 220 is formed between the substrate 210 and the face plate 186. The grid electrode 220 is for modulating the electron beam emitted from the surface conduction type discharge element, and in order to make the electrode of the shape of a stripe established by intersecting perpendicularly with the element line of ladder type arrangement pass an electron beam, corresponding to each element, the opening 221 circular one piece at a time is formed. The configuration or installation position of a grid are not necessarily limited to what was shown in drawing 22 . For example, many passage mouths can also be prepared in the shape of a mesh as opening, and a grid can also be prepared the circumference and near the surface conduction type discharge element.
[0082] The container outer edge child 222 and the grid container outer edge child 223 are electrically connected with the non-illustrated control circuit.
[0083] With the image formation equipment of this example, the modulating signal for the picture of one line is simultaneously impressed to a grid electrode train synchronizing with driving one train of element lines at a time one by one (scan). Thereby, the irradiation to the fluorescent substance of each electron beam can be controlled, and it can display the picture of one line at a time.

[0084] This image formation equipment can be used also as image formation equipment as an optical printer constituted using the photosensitive drum besides display, such as display of television broadcasting, a video conference system, and a computer, etc.
[0085] Moreover, it is applicable not only to a surface conduction type electron emission element but cold cathode electron sources, such as an MIM type electron emission element and a field emission type electron emission element, as an electron emission element. Furthermore, it is applicable also to the image formation equipment by the source of a thermoelectron.
[0086]
[Example] Although an example is given and this invention is explained in detail hereafter, this invention is not limited to these examples.
[0087] The important section in one example of example 1 this invention is shown in drawing 1 -3. Drawing 1 is drawing showing the display panel of a display-panel unit, and the relation of an electrical circuit substrate. The face plate [ unit / display-panel ] which 1 becomes and a display panel and 2 become from blue sheet glass in 10, The image formation section on the face plate 2 in which, as for 20, the fluorescent substance is formed, The electron emission element section on the rear plate with which 3 consists of blue sheet glass, and the rear plate 3 with which the electron emission element of the above-mentioned 30 ] is formed, There is little comparatively other generation of heat, or febrile electrical parts, such as a frame with which 4 consists of blue sheet glass, an electrical circuit substrate in which the electrical circuit to which 6 drives an electron emission element is formed, and a transistor to which 7 generates heat at the time of an electron emission element drive, and 8 are non-febrility electrical parts without generation of heat.
[0088] 11 is exoergic wiring which consists of a thin film of the exoergic material arranged at the face plate, with the electric supply wiring 12 connected to this, it is energized from the electric feed zone 13, becomes a heat source by generation of heat by metal resistance of the exoergic wiring 11, and supplies the heat to a face plate alternatively. By this example, the electric supply wiring 12 which becomes this from the usual charge of wiring material is connected using the thing which Ag paste was carried thing ] on the face plate 1, was calcinated [ thing ], and made it fix with a dispenser or a printing roller as exoergic wiring 11. What is necessary is just to choose the power supply arranged inside equipment, and the power supply of the equipment exterior as the current supply section 13 according to the composition of equipment, in order to energize to this exoergic wiring 11.
[0089] Drawing 2 is the plan of a display-panel unit, and drawing 3 is the A-A cross section of display-panel unit drawing 1 .
[0090] heat conduction which consists of grease for the wiring with which 5 consists of a flexible substrate, and 9 telling the heat

of an electrical part 7 efficiently to a rear plate in these drawings -- it is a member The same number as drawing 1 shows the same thing.
[0091] Where positioning with relative face plate 2 and rear plate 3 is performed, it seals with frit glass through a housing 4, and it becomes the form of the display panel 10 which is the airtight container which exhausted the interior through the exhaust pipe 101 and was made into the reduced pressure state (vacua). It is prepared in the interior of a display panel 10 so that the electron emission element section 30 may counter on the image formation section 20 and the rear plate 3 on a face plate 2. That is, the reduced pressure space the image formation section 20 and the electron emission section 30 carry out [ space ] an endocyst is formed of a face plate 2, the rear plate 3, and a housing 4.
[0092] The electrical part 7 which generates heat on the electrical circuit substrate 6 is mounted outside the electron emission element section 30, and the other electrical parts 8 are mounted inside. heat conduction which the mechanical connections of the electrical circuit substrate 6 and a display panel 10 become from grease etc. in the portion of an electrical part 7 -- it carries out by the member 9 and wiring 5 performs electrical installation of the electrical circuit substrate 6 and a display panel 10 The display unit 1 is held into a tank and image formation equipment is done.
[0093] In this example, the periphery configuration (profile) of a housing 4 and the periphery configuration (profile) of a face plate 2 were made in agreement, the periphery of the rear plate 3 was made larger than a housing 4, the projecting area was given, and the febrile electrical part 7 in a rear plate is arranged so that it may correspond to the portion of this lobe 3-1. By adopting such composition, the field which arranges a febrile electrical part can be prepared in addition to the electron emission section, and the temperature distribution of the rear plate 3 can be made uniform.
[0094] The driving signal of image formation equipment is transmitted from the electrical circuit substrate 6 to the electron emission element section 30 on the rear plate 3 of a display panel 10 through wiring 5, an electron is emitted from an electron emission element, and a picture is formed in the image formation section 20.
[0095] Except the elevated-temperature section of a face plate 2 generated at the time of the drive of image formation equipment, by this example, the exoergic wiring 11 is arranged near the upper part of a frame 4, has the performance which raises the temperature of the face plate 2 of the aforementioned portion to temperature equivalent to the aforementioned image formation section, or the temperature not more than it, is equalizing the temperature distribution in a face plate 2 more, and can reduce thermal stress and heat deformation of a face plate 2.
[0096] Furthermore, when image formation equipment was driven, within the rear plate of a display panel, the heat of the electron emission section and the heat of an electrical part 7 which are generated with a drive were mostly distributed over homogeneity, and generating of a thermal strain was not seen.
[0097] In addition, the form of an electrical circuit substrate is not limited to this example, may be made the composition of two or more electrical circuit substrates which mounted electrical parts 7 and 8 separately, and can be suitably chosen according to the function.
[0098] Moreover, as shown in drawing 4 , you may combine with the control unit 42 which measures the temperature of a face plate 2 and which arranges a thermo sensor 41 and controls the power supplied to the exoergic wiring 11 at any time using the temperature information acquired from the aforementioned thermo sensor 41. A thermocouple etc. can be used as a thermo sensor 41 in that case.
[0099] Other examples of example 2 this invention are shown in drawing 5 and drawing 6 . this example -- the febrile electrical part 7 -- the outer wall of a housing 4, and the lobe 3-1 of the rear plate 3 -- heat conduction -- it has the composition which carried out contact fixation by the member 9, and the periphery of a housing 4 and the lobe 3-1 of the rear plate 3 are heated by these at least With such a heating method, since heat is transmitted to a face plate 2 through a housing 4, the calorific value by the exoergic wiring 11 formed on the face plate 2 can be decreased, and an efficient temperature control becomes possible.
[0100] Example 3 this example has the composition of having formed the exoergic wiring 11 in the tooth back (field by the side of the electrical circuit substrate 6) of the rear plate 3 as a heating means for thermal-strain prevention of the rear plate 3. The position in which the exoergic wiring 11 was formed using the composition same as exoergic wiring 11 as an example 1 is a position corresponding to a housing 4. In addition, the exoergic wiring 11 is arranged near the upper part of a housing 4 like the example 1 at the face plate 2.
[0101] By adopting such composition, the temperature distribution within a field of the rear plate 3 can be equalized more, and the thermal stress of the rear plate 3 and heat deformation can be reduced. Since a face plate 2 can reduce thermal stress and heat deformation like an example 1, a thermal strain stops being able to produce it furthermore easily in a display panel.
[0102] Moreover, temperature gradients other than the elevated-temperature section of the rear plate 3 and the elevated-temperature section can be decreased by making it the structure which has arranged the radiation fin in the elevated-temperature section on the tooth back of the rear plate 3 as shown in drawing 7 , the calorific value by the exoergic wiring 11 formed on the rear plate 3 can be decreased, and an efficient temperature control becomes possible.
[0103] Furthermore, as shown in drawing 8 , more efficient temperature management can be performed by forming the control unit connected to the exoergic wiring 11 on the rear plate 3 as well as an example 1 at a thermo sensor and this.
[0104] Other examples of this invention are shown in example 4 drawing 9 -12. As a heating means of a face plate 2, these examples form two heating wiring 11, and make operation possible independently, respectively. as a heating means of the rear plate 3 They are the method of making the periphery of the rear plate 3 larger than a housing 4, and giving the projecting area, as shown in drawing 9 , and arranging the febrile electrical part 7 to this lobe, and a method of forming two exoergic wiring 11 and heating it like drawing 11 , in addition to the elevated-temperature section of the tooth back of the rear plate 3. These examples

form two heating wiring 11, they are what enabled the operation of each independently, and the still finer temperature control in heating for thermal-strain prevention of them becomes possible. A thermo sensor and a control unit are added further and more efficient temperature management can be attained as these composition is shown in drawing 10 and drawing 12 .

[0105]

[Effect of the Invention] Since a thermal strain does not occur in a display panel as explained above, the curvature of a panel can be pressed down and reliable image formation equipment can be offered. Moreover, since a radiation fin and an air-cooling fan can be decreased, the image formation equipment which turned a miniaturization, thin-shape-izing, and lightweight can be offered.

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[Translation done.]